10DPW_1.5R1 series

10W - Single/Dual Output DC-DC Converter - Wide Input - Isolated & Regulated

DC-DC Converter 10 Watt

- DIP24 package
- 2:1 input range
- Operating temperature range: -40°C to +85°C
- 1500VDC isolation
- Up to 88% efficiency
- Input under-voltage protection
- Short circuit protection (SCP)
- Over voltage protection,
- Over current protection

Introducing our new 10DPW_1.5R1 series – a high-performance solution in a compact DIP24 package, designed for versatility and reliability. With a 2:1 input range, operating temperature capability from -40°C to +85°C, and 1500VDC isolation, this series delivers up to 88% efficiency while ensuring robust protection features. Built-in safeguards include input under-voltage protection, short-circuit protection (SCP), over-voltage protection, and over-current protection. Ideal for demanding applications in industry, power systems, instrumentation, communication, and rail transit.

Common specifications

Short circuit protection	Input voltage range, continuous, self-recovery
Switching frequency	310 kHz (full load, nominal input voltage)
Operation temperature	-40°C ~+85°C (with derating)
Storage temperature	-55°C ~+125°C
Pin welding can withstand the highest temperature	+300°C (soldering spot is 1.5mm away from case for 10 seconds)
Storage humidity	5~95% RH (non-condensing)
MTBF: (MIL-HDBK-217F@25°C)	> 1,000,000 hours
Input filter	Capacitance Filter
Hot plug	Unavailable
Case material	Aluminum alloy
Package dimensions	32.00 × 20.00 × 11.10mm
Weight	12.7g (typ.)
Cooling method	Free air convection

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load/ no load)	**5VDC nominal input** • Single 3.3VDC output • Single 5VDC output • Other output **12VDC nominal input** • Single 3.3VDC output • Single 5VDC output • Other output **24VDC nominal input** • Single 3.3VDC output • Single 5VDC output • Other output **48VDC nominal input** • Single 3.3VDC output • Single 5VDC output • Other output		1908/36 2381/20 2299/20 759/15 958/5 980/9 379/10 473/5 490/5 190/8 237/5 245/4	1956/54 2439/30 2352/30 776/30 980/12 1028/15 388/25 484/12 515/12 195/20 243/12 258/8	mA
Reflected ripple current	5VDC nominal input 12VDC nominal input 24VDC nominal input 48VDC nominal input		60 50 40 30		
Impulse voltage	5VDC nominal input 12VDC nominal input 24VDC nominal input 48VDC nominal input	-0.7 -0.7 -0.7 -0.7		15 25 50 100	VDC
Starting voltage	5VDC nominal input 12VDC nominal input 24VDC nominal input 48VDC nominal input			4.5 9 18 36	VDC
Input undervoltage protection	5VDC nominal input 12VDC nominal input 24VDC nominal input 48VDC nominal input	3 5.5 12 25	4 6.5 15.5 30.5		VDC
CTRL	Module shutdown Module enabled	0 - 0.7V shutdown Suspended or 3.5 - 12V open			

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy (0%- 100% load)	Positive output Negative output		±1 ±2	±3 ±5	%
Linear regulation (Input voltage from low limit to high limit, full load)	Positive output Negative output		±0.2 ±0.5	±1 ±1.5	%
Load regulation (10% - 100% load)	Positive output Negative output		±0.5 ±0.8	±1 ±2	%
Ripple & noise (20MHz bandwidth 5% - 100% load)	Single 3.3/5VDC other output		40 40	80 100	mVp-p
Transient Recovery Time	25% load step change		300	500	ms
Transient response deviation (25% load step change)	Single 3.3/5VDC other output		±5 ±3	±8 ±5	%
Temperature drift coefficient	Full Load			±0.03	%/°C
Overcurrent protection (Input voltage range)	Single 3.3/5VDC other output	110 110	160 140	230 190	%Io

Note: 1. Auxiliary circuit output voltage (Vo2) maximum accuracy is ±5%;

2. Load regulation for 0% - 100% load is ±5%.

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output, test time 1 minute, leakage current less than 1mA	1500			VDC
Isolation resistance	Input-output, isolated voltage 500VDC	1000			MΩ
Isolation capacitance	Input-output, 100KHz/0.1V		1000		pF

Example:
10DPW_2405S1.5
10 = 10Watt; D = DIP; P = Series; W = Wide input; 24 = 24Vin; 05 = 5Vout; S = Single Output; 1.5 = 1500VDC isolation

1. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
2. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
3. Suggested dual output module load imbalance: ≤ ± 5%. If it exceeds ± 5%, it cannot be guaranteed that the product performance meets all performance indicators in this datasheet;
4. The maximum capacitive load is tested within the input voltage range and under full load conditions;
5. Unless otherwise specified, all indicators in this manual are measured at Ta = 25 °C, humidity <75% RH, nominal input voltage, and output rated load;
6. All indicator testing methods in this datasheet are based on our standards;
7. Product specifications are subject to change without prior notice.

GAPTEC-Electronic GmbH & Co. KG
sales@gaptec-electronic.com – www.gaptec-electronic.com

EMC specifications

EMC	EMI	CE	CISPR32/EN55032	CLASS A (without extra components)/ CLASS B (recommended circuit diagram 3-②)		
EMC	EMI	RE	CISPR32/EN55032	CLASS A (without extra components)/ CLASS B (recommended circuit diagram 3-②)		
EMC	EMS	ESD	IEC/EN61000-4-2	Contact ±4kV	Perf. Criteria	B
EMC	EMS	RS	IEC/EN61000-4-3	10V/m	Perf. Criteria	A
EMC	EMS	EFT	IEC/EN61000-4-4	±2kV (recommended circuit diagram 3-①)	Perf. Criteria	B
EMC	EMS	Surge	IEC/EN61000-4-5	±2kV (recommended circuit diagram 3-①)	Perf. Criteria	B
EMC	EMS	CS	IEC/EN61000-4-6	10Vr.m.s	Perf. Criteria	A
EMC	EMS	Voltage sag, drop, and short-term interruption immunity	IEC/EN61000-4-29	0-70%	Perf. Criteria	B

Product Selection Guide

Approval	Part number	Input Voltage Nominal (Range) (VDC)	Input Voltage Max. (VDC)	Output Voltage (VDC)	Output Current (mA) Max.	Full Load Efficiency% (typ.)	Capacitive Load Max. (µF)
	10DPW_0503S1.5R1	5 (4.5-9)	12	3.3	2400/0	83	1200
	10DPW_0505S1.5R1	5 (4.5-9)	12	5	2000/0	83	1000
	10DPW_0512S1.5R1	5 (4.5-9)	12	12	833/0	85	470
	10DPW_0515S1.5R1	5 (4.5-9)	12	15	667/0	85	330
	10DPW_0524S1.5R1	5 (4.5-9)	12	24	416/0	87	100
	10DPW_1203S1.5R1	12 (9-18)	20	3.3	2400/0	87	1200
	10DPW_1205S1.5R1	12 (9-18)	20	5	2000/0	83	1000
	10DPW_1212S1.5R1	12 (9-18)	20	12	833/0	87	470
	10DPW_1215S1.5R1	12 (9-18)	20	15	667/0	87	330
	10DPW_1224S1.5R1	12 (9-18)	20	24	416/0	88	100
	10DPW_2403S1.5R1	24 (18-36)	40	3.3	2400/0	87	1200
	10DPW_2405S1.5R1	24 (18-36)	40	5	2000/0	83	1000
	10DPW_2412S1.5R1	24 (18-36)	40	12	833/0	87	470
	10DPW_2415S1.5R1	24 (18-36)	40	15	667/0	87	330
	10DPW_2424S1.5R1	24 (18-36)	40	24	416/0	88	100
	10DPW_4803S1.5R1	48 (36-75)	80	3.3	2400/0	87	1200
	10DPW_4805S1.5R1	48 (36-75)	80	5	2000/0	83	1000
	10DPW_4812S1.5R1	48 (36-75)	80	12	833/0	87	470
	10DPW_4815S1.5R1	48 (36-75)	80	15	667/0	87	330
	10DPW_4824S1.5R1	48 (36-75)	80	24	416/0	88	100

Approval	Part number	Input Voltage Nominal (Range) (VDC)	Input Voltage Max. (VDC)	Output Voltage (VDC)	Output Current (mA) Max.	Full Load Efficiency% (typ.)	Capacitive Load Max. (µF)
	10DPW_0505D1.5R1	5 (4.5-9)	12	±5	±1000/0	82	1000
	10DPW_0512D1.5R1	5 (4.5-9)	12	±12	±416/0	86	470
	10DPW_0515D1.5R1	5 (4.5-9)	12	±15	±333/0	87	330
	10DPW_1205D1.5R1	12 (9-18)	20	±5	±1000/0	83	1000
	10DPW_1212D1.5R1	12 (9-18)	20	±12	±416/0	87	470
	10DPW_1215D1.5R1	12 (9-18)	20	±15	±333/0	87	330
	10DPW_2405D1.5R1	24 (18-36)	40	±5	±1000/0	83	1000
	10DPW_2412D1.5R1	24 (18-36)	40	±12	±416/0	87	470
	10DPW_2415D1.5R1	24 (18-36)	40	±15	±333/0	87	330
	10DPW_4805D1.5R1	48 (36-75)	80	±5	±1000/0	83	1000
	10DPW_4812D1.5R1	48 (36-75)	80	±12	±416/0	87	470
	10DPW_4815D1.5R1	48 (36-75)	80	±15	±333/0	87	330

Typical characteristics

Temperature derating graph

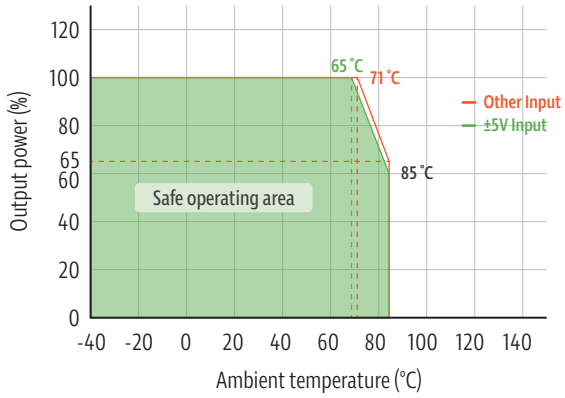
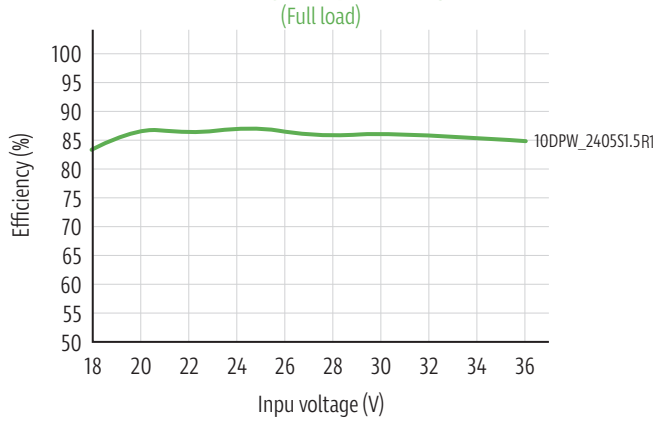
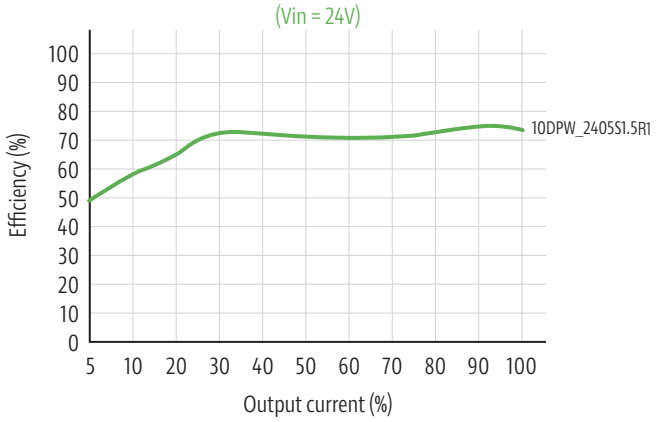


Figure1

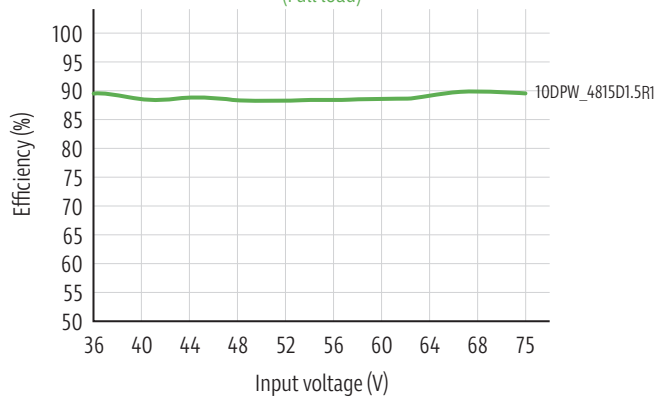
Efficiency vs input voltage
(Full load)



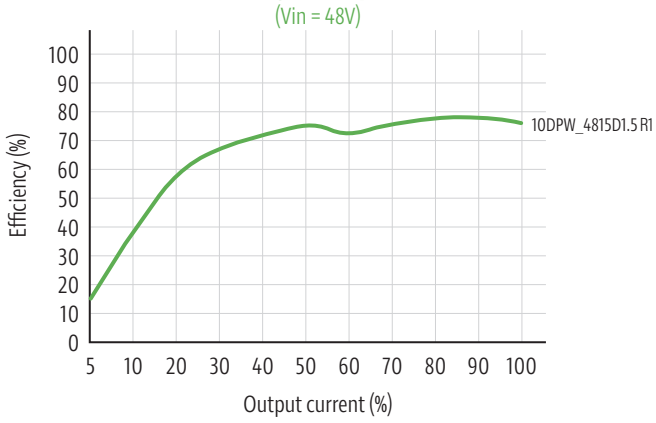
Efficiency vs output load
(Vin = 24V)



Efficiency vs input voltage
(Full load)



Efficiency vs output load
(Vin = 48V)



Typical circuit design and application

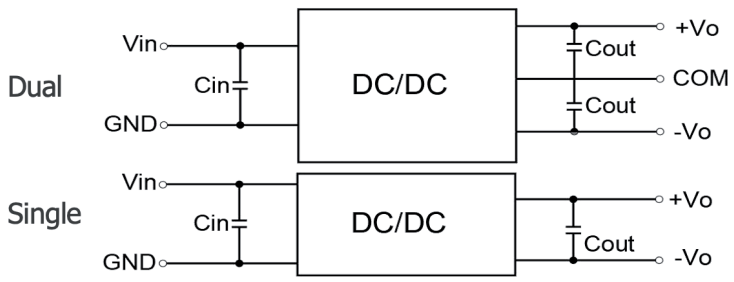


Figure2

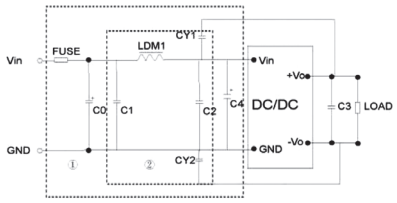
Recommended capacitive load value table

Vin	12/24V	48V
Cin	100uF	10-47uF
Cout	10uF	

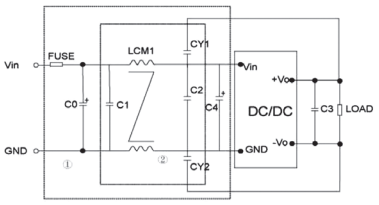
Application circuit description:
1. All DC-DC converters in this series are tested according to the recommended testing circuit (Figure 2) before leaving the factory.

2. If further reduction of input and output ripple is required, the input and output external capacitor Cin1 can be connected Increase or select capacitors with small series equivalent impedance values for Cin2, Cs, and Cout, Cs are used to reduce ripple, and if the ripple meets the demand, there is no need to add Cs. But suitable filtering capacitors should be selected, as excessive capacitance may cause startup problems. For each output, under safe and reliable working conditions, the maximum capacitance value of its filtering capacitor cannot exceed the maximum capacitive load of the product.

EMI recommended component parameters



3.3VDC, 5VDC output (figure 3)



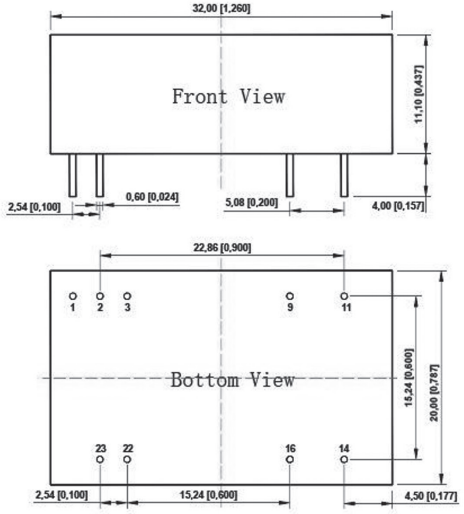
Other output (figure 4)

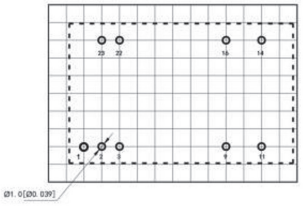
EMI recommended component parameters

Model	Vin: 5V	Vin: 12V	Vin: 24V	Vin: 48V
FUSE	Select based on the actual input current of the customer			
C0, C4	820μF/16V	470μF/35V	330μF/50V	330μF/100V
C1, C2	10μF/50V	10μF/50V	10μF/50V	10μF/100V
C3	Refer to the Cout in Fig.2			
LCM1	1.4 - 1.7mH			
LDM1	10uH			
CY1, CY2	1nF/2kV			

Note: Part ① of figure 3 is used for EMC testing; part 2 is used for EMI filtering and can be selected according to requirements.

Mechanical dimensions





The grid distance is 2.54mm x2.54mm

Note:
Unit: mm [inch]
Pin section tolerances: ±0.10 [±0.004]
General tolerances: ±0.50 [±0.020]

Pin definition table

Pin	Single	Double
1	CTRL	CTRL
2	GND	GND
3	GND	GND
9	NO PIN	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

NC: Pin to be isolated from circuity